

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

WHAT IS CLAIMED IS:

1. A wiring substrate, in which a wiring stacked portion including a conductor layer and a resin layer is stacked on a principal face of a core substrate including a substantially cylindrical through hole conductor in a through hole extending therethrough and a filling material filling a hollow portion of said through hole, comprising:
 - a cover-shaped conductor portion covering an end face of said through hole just above a principal face of said core substrate and connected to said through hole conductor; and
 - a terminal pad conductor provided over a principal face of said wiring stacked portion for disposing connection terminals used for connections with an external device,
wherein a connection portion composed of via conductors buried in said resin layer brings said cover-shaped connection portion and said terminal pad conductor into conduction, and
said via conductors composing said connection portion are provided not above a center axis of said through hole.
- 20 2. The wiring substrate according to claim 1, wherein said via conductors are provided not above said filling material in said through hole conductor.
- 25 3. The wiring substrate according to claim 1, wherein, of said via conductors, the via conductors to be connected with

said cover-shaped conductor portion are conformal vias.

4. The wiring substrate according to Claim 1, wherein,
of said via conductors, the via conductors to be connected with
5 said terminal pad conductor are provided not above said through
hole.

5. The wiring substrate according to any of claim 1,
wherein, of said via conductors, the via conductors on a side
10 of said terminal pad conductor are more spaced above said through
hole from a center axis of said through hole than the via
conductors on a side of said cover-shaped conductor portion.

6. The wiring substrate according to claim 1, wherein
15 said connection portion has a stacked via structure, in which
a plurality of filled vias are substantially concentrically
contiguous to each other at positions other than that above
said through hole.

20 7. The wiring substrate according to claim 1, wherein
said through hole is out of position below a center axis of
said terminal pad conductor.

8. A wiring substrate comprising:
25 a core substrate including an insulating substrate, a

through hole provided through the insulating substrate, a substantially cylindrical through hole conductors formed on an inner circumference of said through hole, and a filling material filling a hollow portion of said through hole
5 conductors;

a cover-shaped conductor layer provided on at least one principal face of said core substrate and in a shape containing an end face of said through hole and having conduction to said through hole conductor;

10 a plurality of resin layers provided over said cover-shaped conductor layer;

a ball pad conductor provided over said resin layers and having solder balls to be connected with connection terminals of an external device; and

15 a connection portion including via conductors buried individually in said resin layers for bringing said cover-shaped conductor layer and said ball pad conductor into conduction,

wherein said via conductors are made of filled vias, and
20 in case a through direction of said through hole is a center axis direction, an individual center axes of said via conductors composing said connection portion and said ball pad conductor are not aligned with the center axis of said through hole.

9. A wiring substrate comprising:
- a core substrate including an insulating substrate, a through hole provided through the insulating substrate, a substantially cylindrical through hole conductors formed on
- 5 an inner circumference of said through hole, and a filling material filling a hollow portion of said through hole conductors;
- a cover-shaped conductor layer provided on at least one principal face of said core substrate and in a shape containing
- 10 an end face of said through hole and having conduction to said through hole conductor;
- a plurality of resin layers provided over said cover-shaped conductor layer;
- a ball pad conductor provided over said resin layers and
- 15 having solder balls to be connected with connection terminals of an external device; and
- a connection portion including via conductors buried individually in said resin layers for bringing said cover-shaped conductor layer and said ball pad conductor into
- 20 conduction,
- wherein the via conductor of said connection portion, which is connected to said cover-shaped conductor layer, is composed of conformal vias whereas the remaining via conductors are composed of filled vias, and
- 25 in case a through direction of said through hole is a

center axis direction, an individual center axes of said via conductor composed of said filled vias and said ball pad conductor are not aligned with the center axis of said through hole.

5

10. The wiring substrate according to claim 1, wherein a center axes of said via conductors are spaced by 50 μm or more and 300 μm or less from a center axis of the through hole.